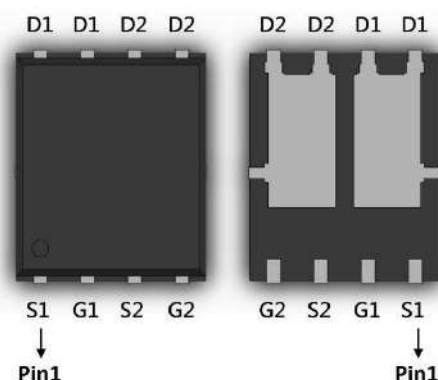


N- AND P-Channel Enhancement Mode Power MOSFET

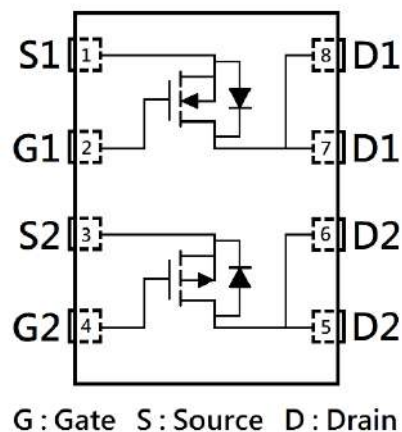
Features:

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

DFN5×6



	N-CH	P-CH
BV_{DSS}	40V	-40V
$I_D @ V_{GS}=(-)10V, T_C=25^{\circ}C$	21A	-14A
$I_D @ V_{GS}=(-)10V, T_A=25^{\circ}C$	7.4A	-5A
$R_{DS(ON)typ.} @ V_{GS}=(-)10V$	16mΩ	37mΩ
$R_{DS(ON)typ.} @ V_{GS}=(-)4.5V$	23mΩ	50mΩ



Ordering Information

Device	Package	Shipping
KPRB020C04R	DFN5×6 (RoHS compliant & Halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits		Unit
			N-CH	P-CH	
Drain-Source Voltage		V _{DS}	40	-40	V
Gate-Source Voltage		V _{GS}	±20	±20	
Continuous Drain Current @ V _{GS} =(-)10V, T _C =25°C		I _D	21	-14	A
Continuous Drain Current @ V _{GS} =(-)10V, T _C =100°C			13	-9	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =25°C			7.4	-5	
Continuous Drain Current @ V _{GS} =(-)10V, T _A =70°C			6	-4	
Pulsed Drain Current		I _{DM}	50	-40	
Continuous Body Diode Forward Current @ T _C =25°C		I _S	14	-14	
Avalanche Current @ L=0.1mH		I _{AS}	5	-15	mJ
Avalanche Energy @ L=0.5mH		E _{AS}	4	16	
Total Power Dissipation	T _C =25°C	P _D	18		W
	T _C =100°C		7.2		
	T _A =25°C		2.1		
	T _A =70°C		1.3		
Operating Junction and Storage Temperature Range		T _J , T _{stg}	-55~+150		°C

Thermal Data

Parameter	Symbol	Steady State	Unit
Thermal Resistance, Junction-to-case	R _{θJC}	7	°C/W
Thermal Resistance, Junction-to-ambient	R _{θJA}	60	

Note:

- *a. The power dissipation P_D is based on T_{J(MAX)}=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
- *b. The value of R_{θJA} is measured with the device mounted on 1 in² FR -4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_D is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- *c. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

N-Channel Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	40	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1	-	2.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	7.5	-	S	V _{DS} =5V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =32V, V _{GS} =0V
R _{DS(ON)}	-	16	21	mΩ	V _{GS} =10V, I _D =7A
	-	23	33		V _{GS} =4.5V, I _D =5A
Dynamic					
C _{iss}	-	275	-	pF	V _{DS} =20V, V _{GS} =0V, f=1MHz
C _{oss}	-	135	-		
C _{rss}	-	23	-		
R _g	-	0.4	-	Ω	f=1MHz
Q _g *1, 2	-	5.5	-	nC	V _{DS} =20V, I _D =5A, V _{GS} =10V
Q _{gs} *1, 2	-	1	-		
Q _{gd} *1, 2	-	1	-		
t _{d(ON)} *1, 2	-	4.5	-	ns	V _{DS} =20V, I _D =5A, V _{GS} =10V, R _{GS} =1Ω
t _r *1, 2	-	14	-		
t _{d(OFF)} *1, 2	-	13	-		
t _f *1, 2	-	5	-		
Source-Drain Diode					
V _{SD} *1	-	0.85	1.2	V	I _S =5A, V _{GS} =0V
t _{rr}	-	9.3	-	ns	I _F =5A, dI _F /dt=100A/μs
Q _{rr}	-	2.6	-	nC	

Note:

*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

*2. Independent of operating temperature

P-Channel Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-40	-	-	V	V _{GS} =0V, I _D =-250μA
V _{GS(th)}	-1	-	-2.5		V _{DS} =V _{GS} , I _D =-250μA
G _{FS}	-	8	-	S	V _{DS} =-10V, I _D =-4A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-32V, V _{GS} =0V
R _{DS(ON)}	-	37	48	mΩ	V _{GS} =-10V, I _D =-5A
	-	50	70		V _{GS} =-4.5V, I _D =-3A
Dynamic					
C _{iss}	-	930	-	pF	V _{DS} =-20V, V _{GS} =0V, f=1MHz
C _{oss}	-	80	-		
C _{rss}	-	60	-		
R _g	-	17	-	Ω	f=1MHz
Q _g *1, 2	-	19	-	nC	V _{DS} =-20V, I _D =-3A, V _{GS} =-10V
Q _{gs} *1, 2	-	2.8	-		
Q _{gd} *1, 2	-	3.6	-		
t _{d(ON)} *1, 2	-	6.8	-	ns	V _{DS} =-20V, I _D =-3A, V _{GS} =-10V, R _{GS} =1Ω
t _r *1, 2	-	19	-		
t _{d(OFF)} *1, 2	-	65	-		
t _f *1, 2	-	31	-		
Source-Drain Diode					
V _{SD} *1	-	-0.8	-1.2	V	I _S =-3A, V _{GS} =0V
t _{rr}	-	9.5	-	ns	I _F =-3A, dI _F /dt=100A/μs
Q _{rr}	-	5	-	nC	

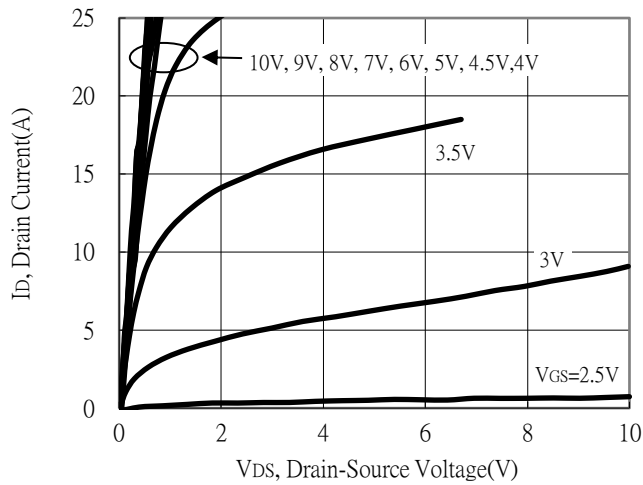
Note:

*1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

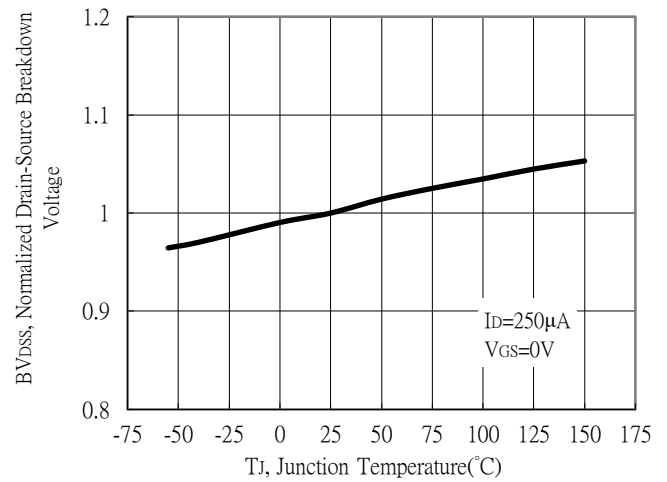
*2. Independent of operating temperature

Typical Characteristics : Q1(N-channel)

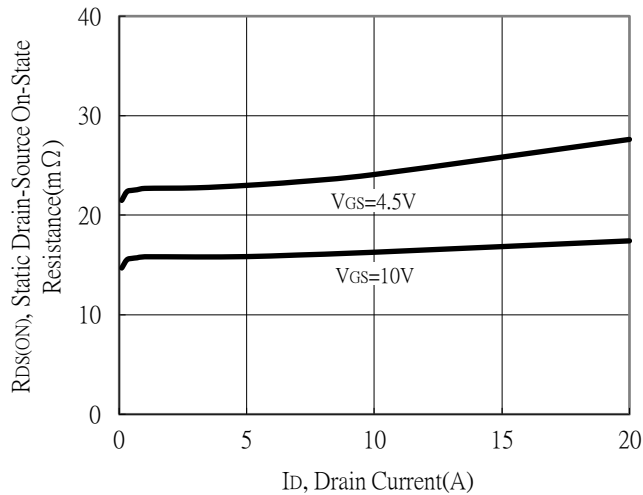
Typical Output Characteristics



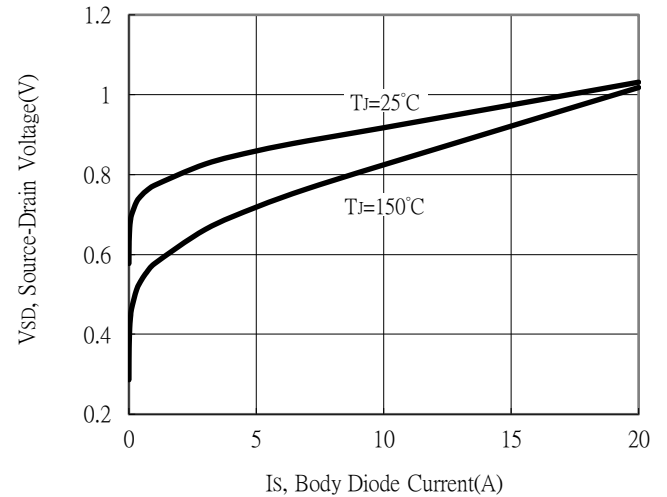
Breakdown Voltage vs Ambient Temperature



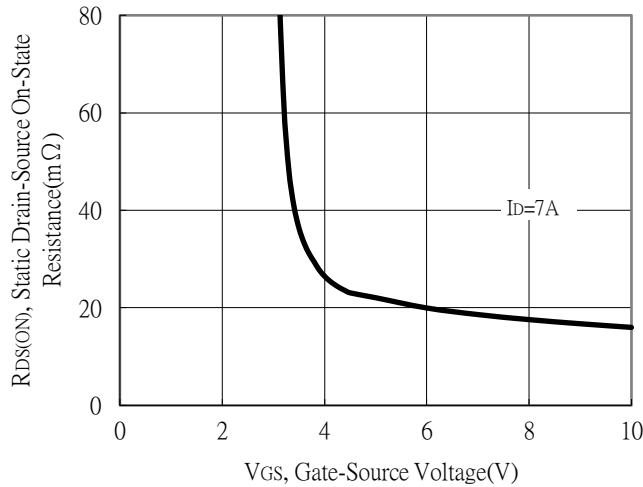
Static Drain-Source On-State resistance vs Drain Current



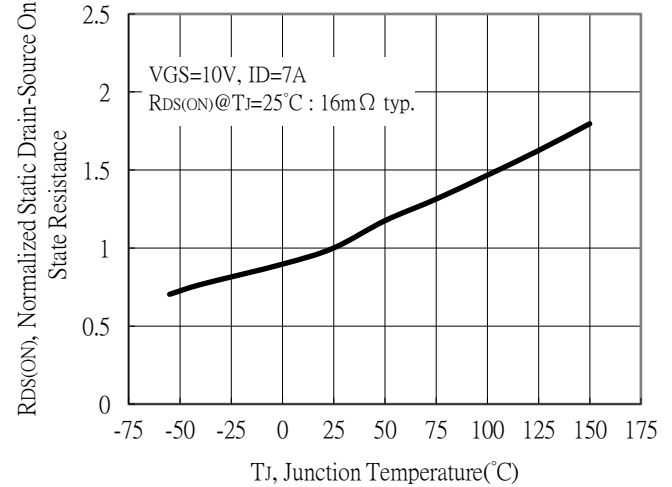
Body Diode Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

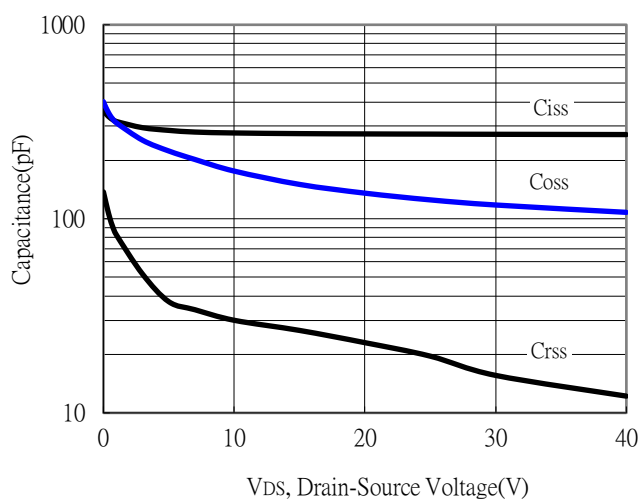


Drain-Source On-State Resistance vs Junction Temperature

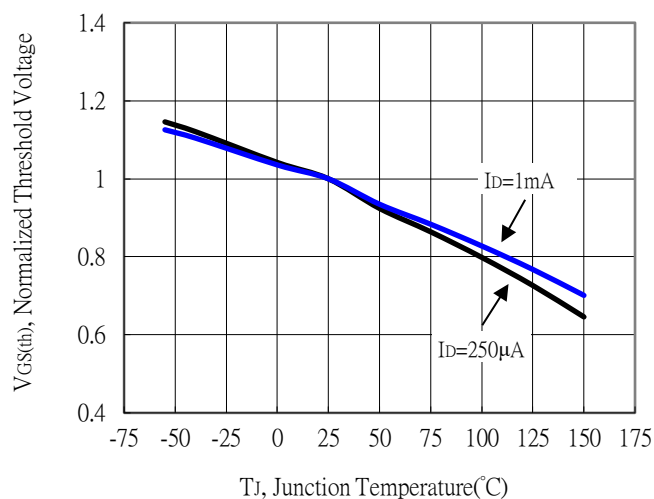


Typical Characteristics (Cont.) : Q1(N-channel)

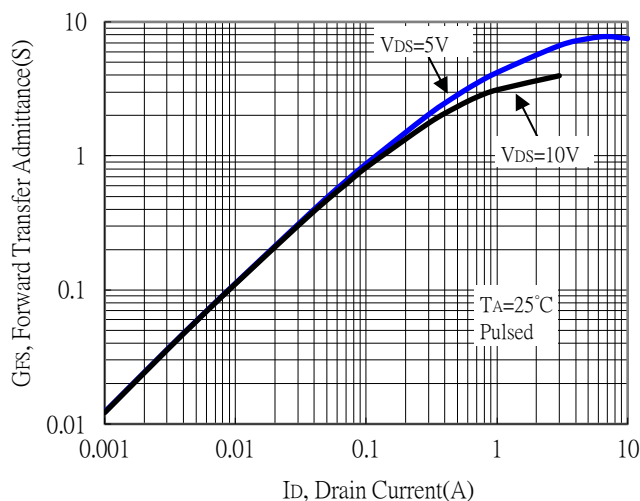
Capacitance vs Drain-to-Source Voltage



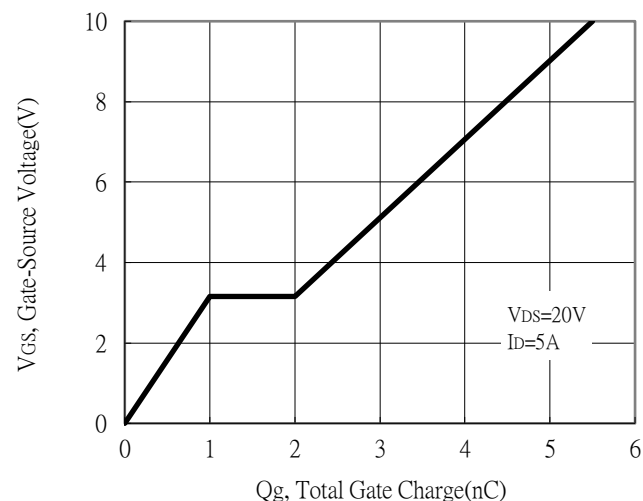
Threshold Voltage vs Junction Temperature



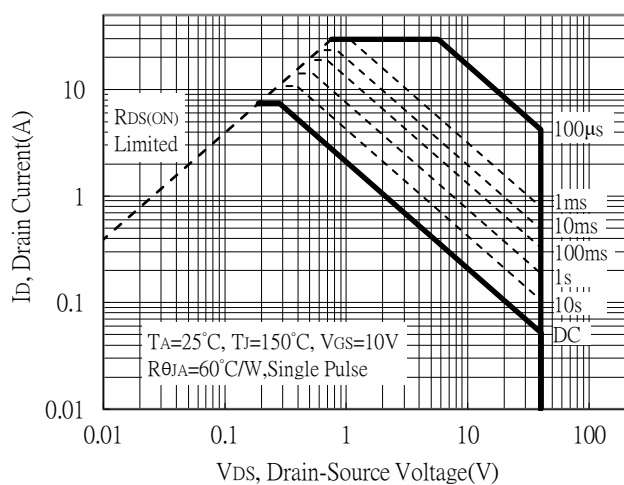
Forward Transfer Admittance vs Drain Current



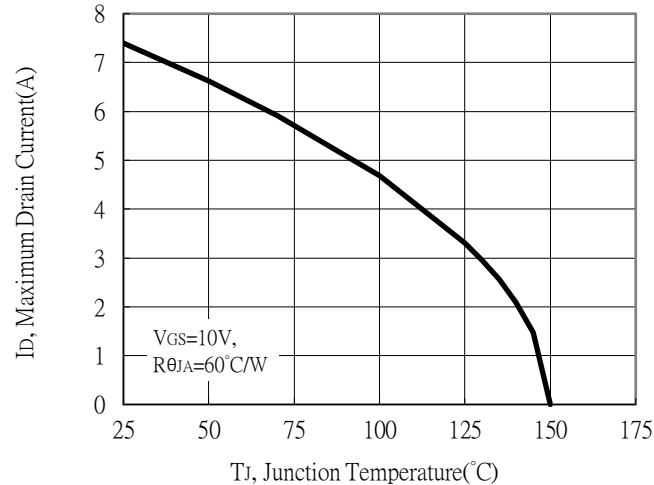
Gate Charge Characteristics



Maximum Safe Operating Area

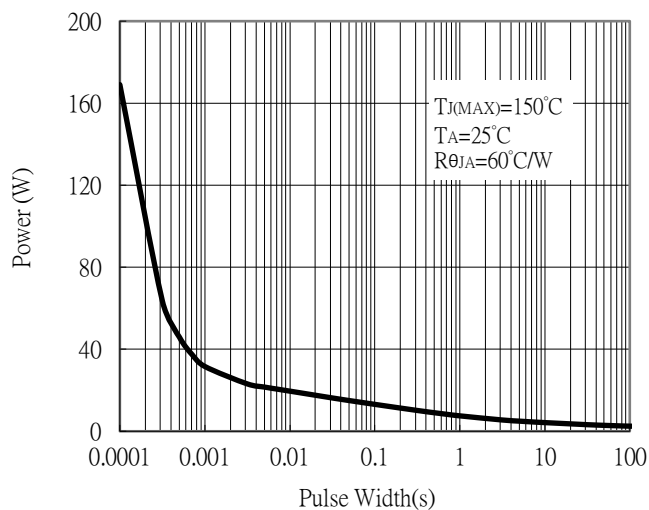


Maximum Drain Current vs Junction Temperature

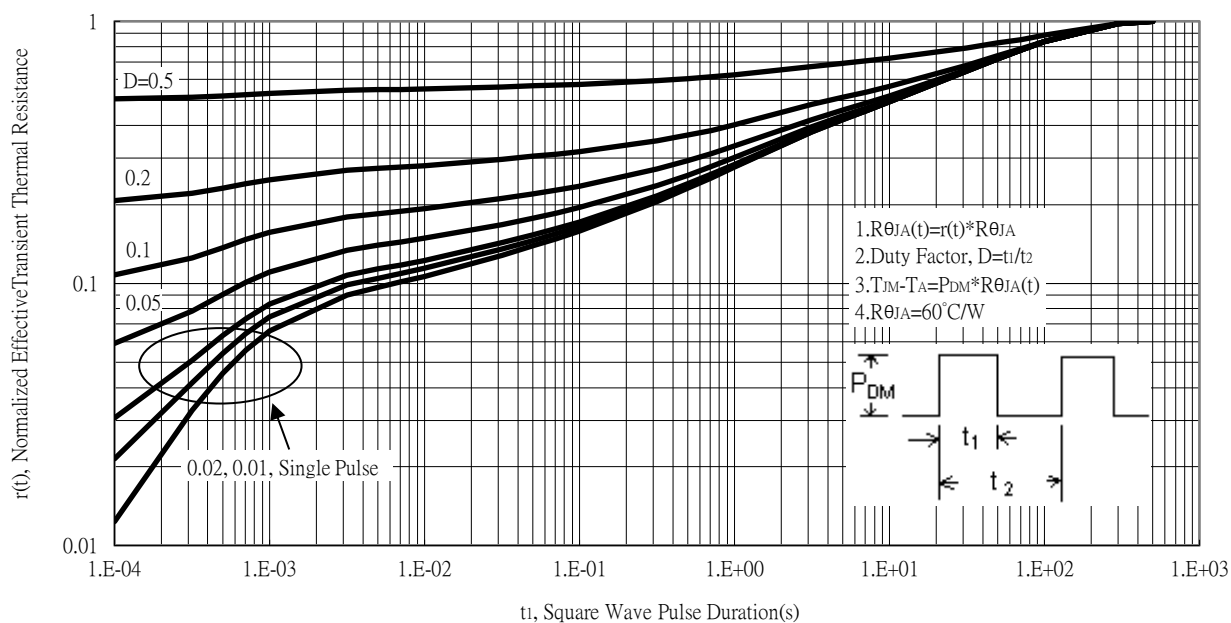


Typical Characteristics (Cont.) : Q1(N-channel)

Single Pulse Power Rating, Junction to Ambient

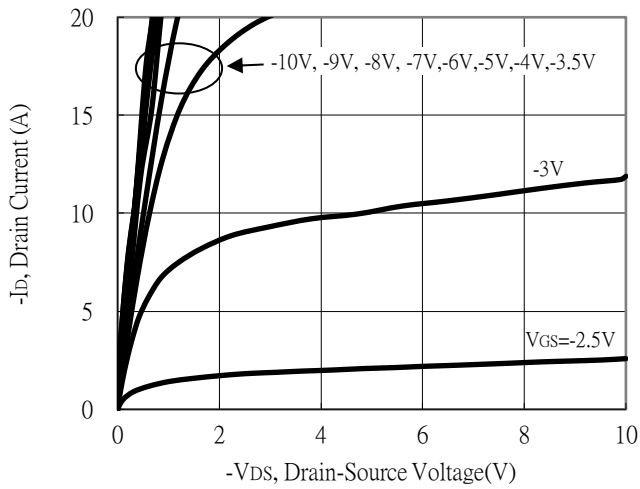


Transient Thermal Response Curves

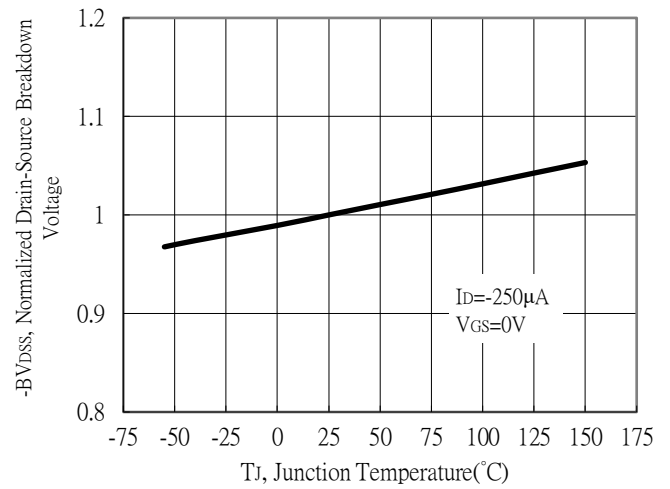


Typical Characteristics : Q2(P-channel)

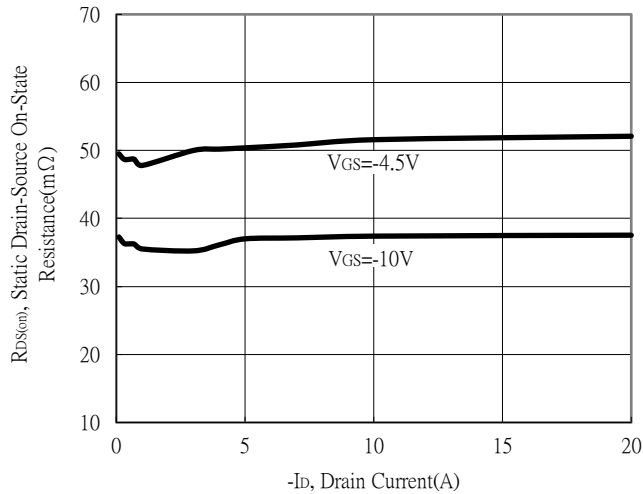
Typical Output Characteristics



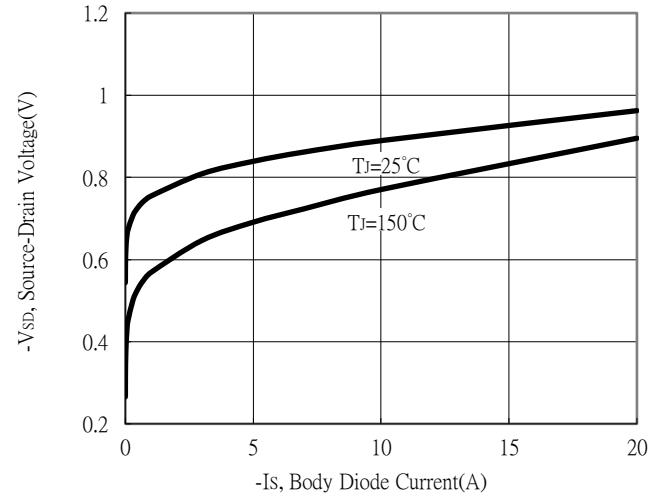
Breakdown Voltage vs Ambient Temperature



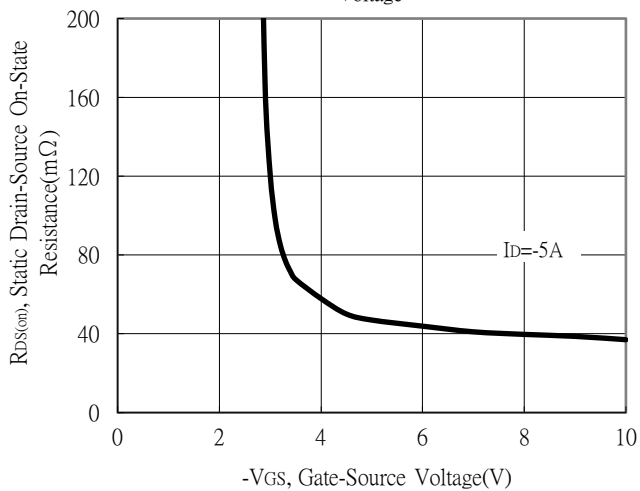
Static Drain-Source On-State resistance vs Drain Current



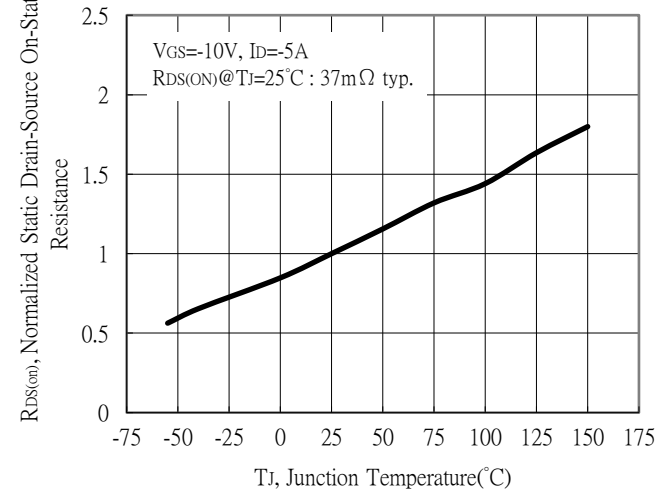
Body Diode Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

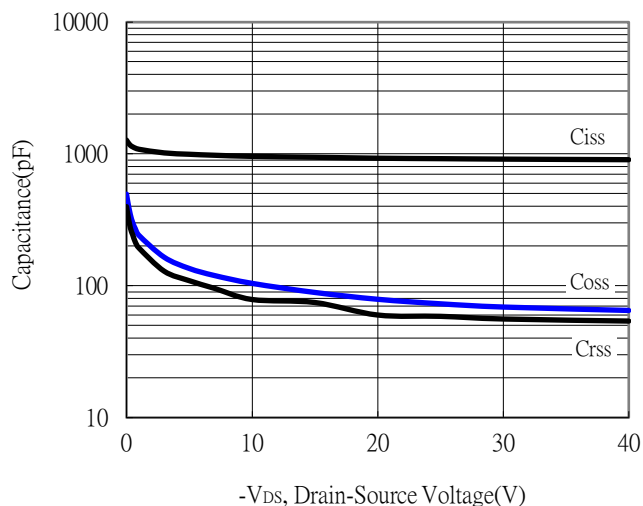


Drain-Source On-State Resistance vs Junction Temperature

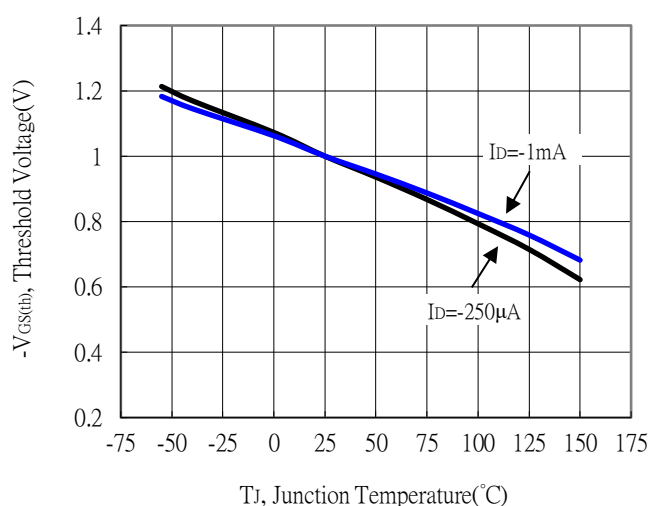


Typical Characteristics (Cont.) : Q2(P-channel)

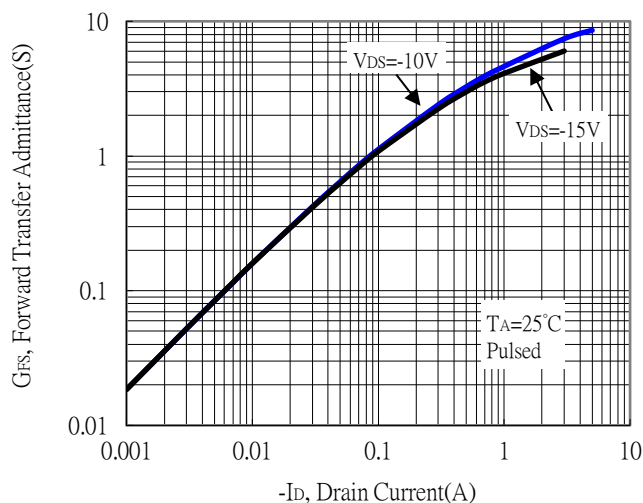
Capacitance vs Drain-to-Source Voltage



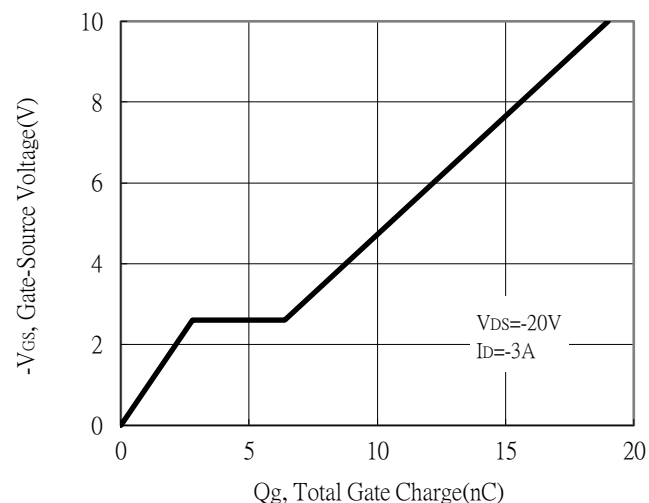
Threshold Voltage vs Junction Temperature



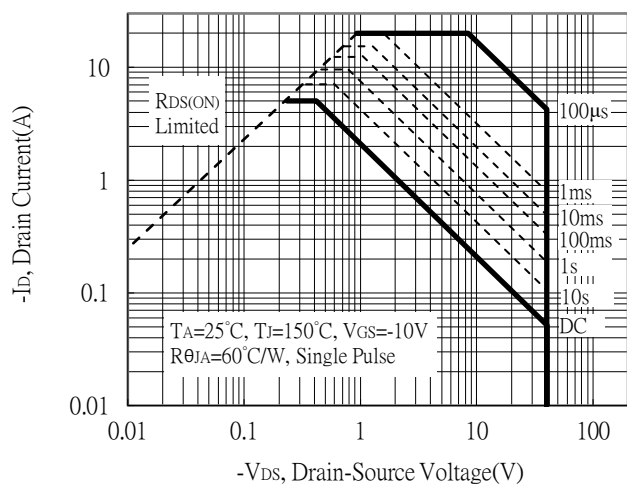
Forward Transfer Admittance vs Drain Current



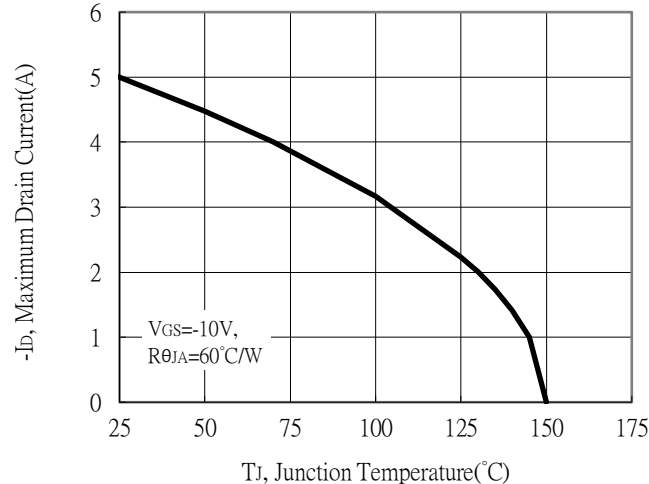
Gate Charge Characteristics



Maximum Safe Operating Area

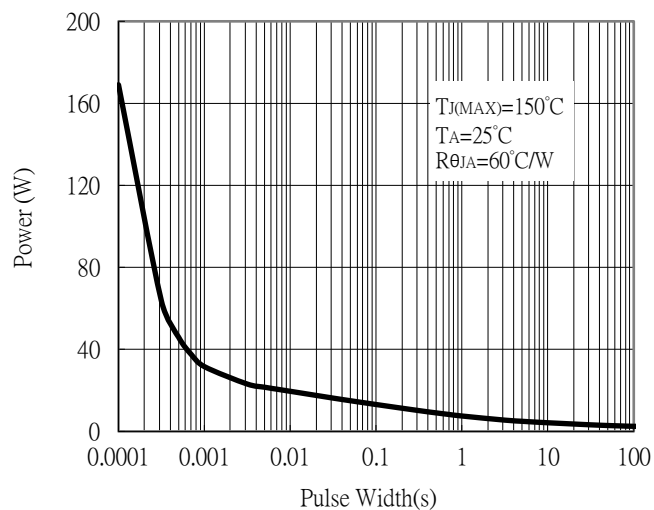


Maximum Drain Current vs Junction Temperature

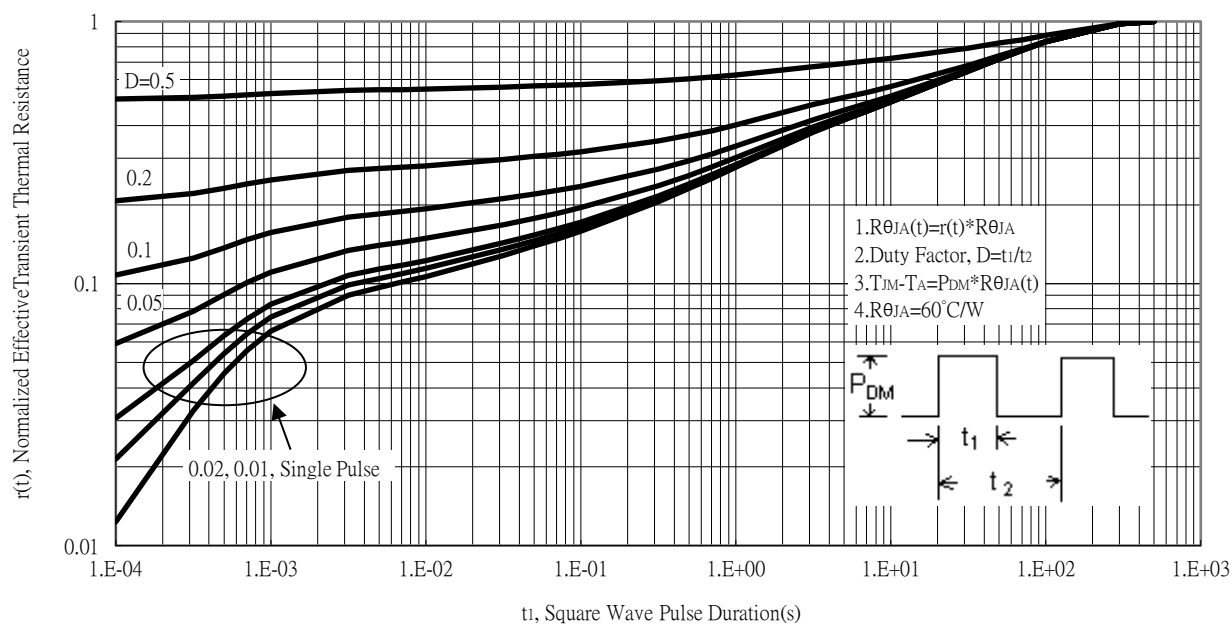


Typical Characteristics (Cont.) : Q2(P-channel)

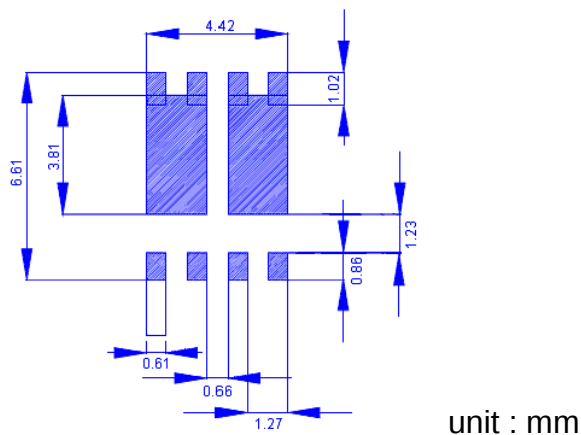
Single Pulse Power Rating, Junction to Ambient



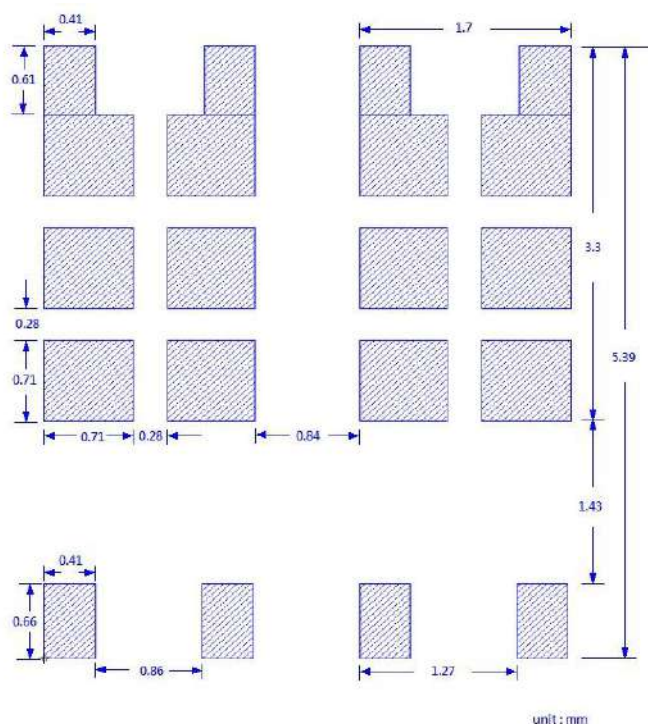
Transient Thermal Response Curves



Recommended Soldering Footprint

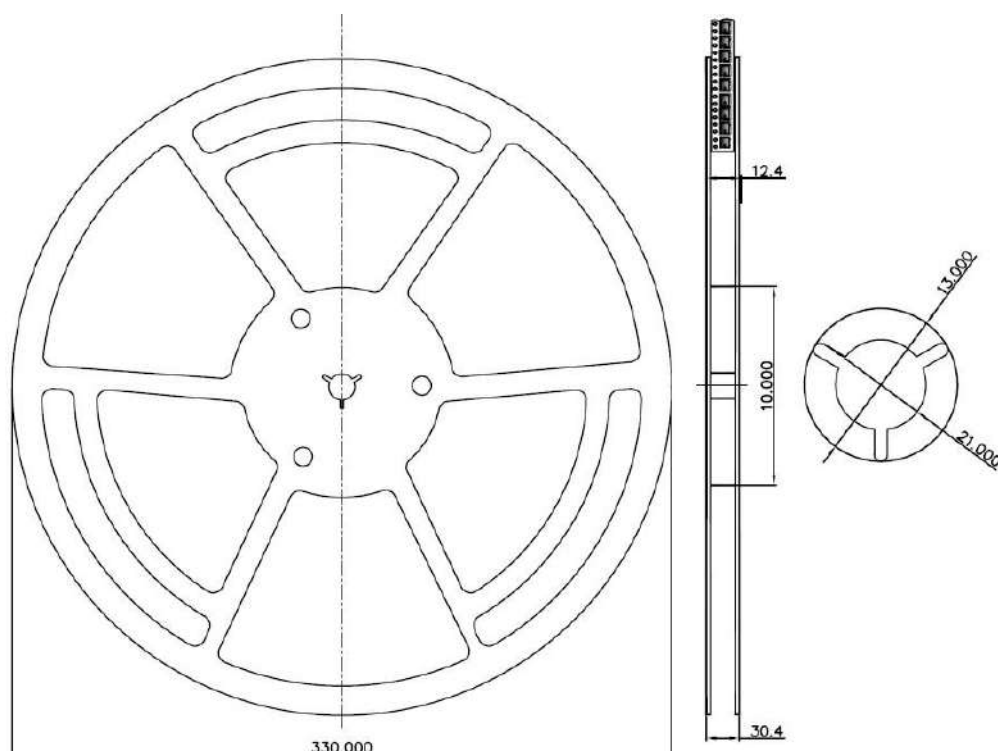


Recommended Stencil Design

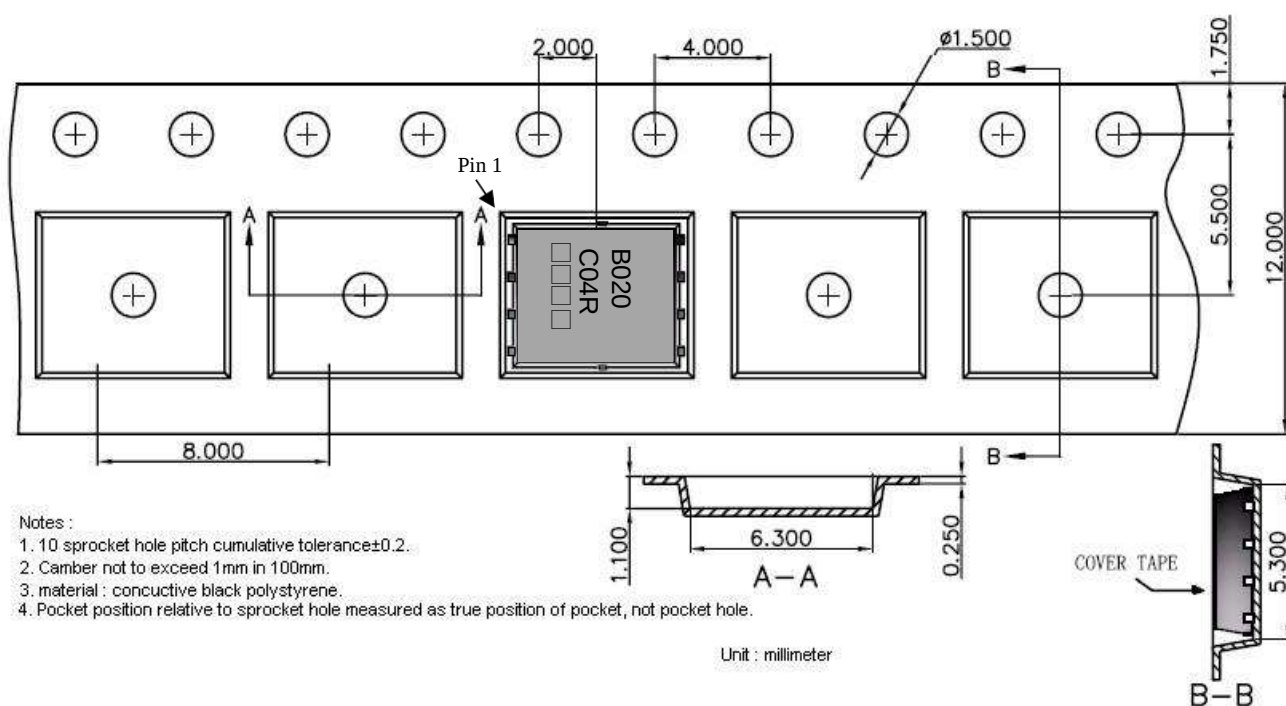


- Note :
1. Stencil thickness 5 mil (0.127mm)
 2. May need to be adjusted to specific requirements.

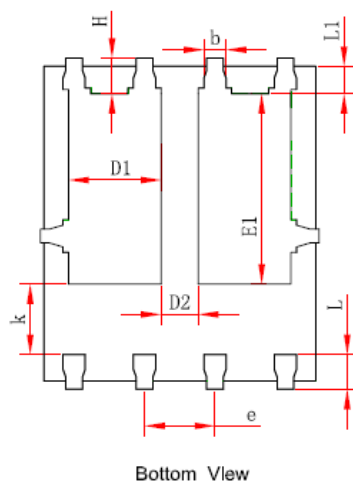
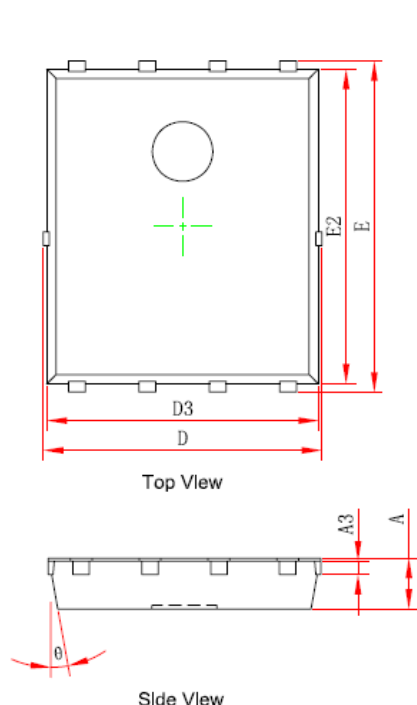
Reel Dimension



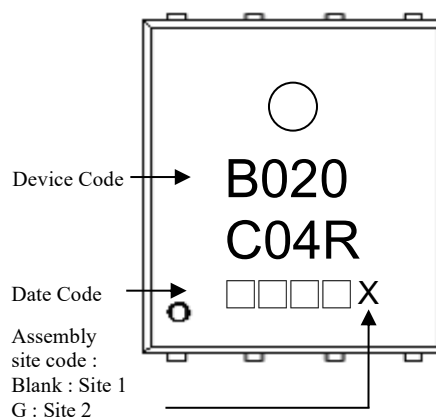
Carrier Tape Dimension



DFN5x6 Dimension



Marking:



Date Code(counting from left to right) :

1st code: year code, the last digit of Christian year

2nd code : month code, Jan→A, Feb→B, Mar→C, Apr→D,

May→E, Jun→F, Jul→G, Aug→H, Sep→J,

Oct→K, Nov→L, Dec→M

3rd and 4th codes : production serial number, 01~99

8-Lead DFN5x6 Plastic Package

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039	E2	5.674	5.826	0.223	0.229
A3	0.254	REF	0.010	REF	k	1.190	1.390	0.047	0.055
D	4.944	5.096	0.195	0.201	b	0.350	0.450	0.014	0.018
E	5.974	6.126	0.235	0.241	e	1.270	TYP	0.050	TYP
D1	1.470	1.870	0.058	0.074	L	0.559	0.711	0.022	0.028
D2	0.470	0.870	0.019	0.034	L1	0.424	0.576	0.017	0.023
E1	3.375	3.575	0.133	0.141	H	0.574	0.726	0.023	0.029
D3	4.824	4.976	0.190	0.196	θ	10°	12°	10°	12°